


vinylpyrrolidone, said modified natural rubber having a graft efficiency of 62.7% or more; or

 B) epoxidizing said deproteinized natural rubber wherein [and] an epoxidation rate is sufficient to produce a modified deproteinized natural rubber having an epoxidation ratio [per 5 hours] of 26.0% or more in 5 hours.

REMARKS

Claims 1-3 and 7-10 are pending in the present application. Support for the amendment to claim 1 is found at page 21, line 9. No new matter has been added, and there is no need for a further search.

Rejections Under 35 USC 103

Claims 1-3 and 7-10 stand rejected under 35 USC 103(a) as being unpatentable over Tanaka et al EP 584,597 taken with Kondo et al US 4,208,490, Burlett et al US 5,118,546 or Hayashi et al US 4,528,340. The Examiner has inadvertently reversed the lead inventors first and last names for EP 584,597, and as such, Tanaka et al is hereafter referred to as Yasuyuki et al. Applicants respectfully traverse the rejections.

Applicants respectfully submit that unobviousness can reside in the discovery of the cause of a problem, the solution of which employs a combination of old elements. *In re Spinnoble* (CCPA 1969) 160 USPQ 237.

Applicants have identified and solved a problem associated with either grafting or epoxidizing *natural* rubber with a high efficiency or epoxidation ratio, respectively. The problem with grafting the natural rubbers is that the proteins, naturally occurring in the rubber, adversely affect the grafting and epoxidation process, thereby reducing the efficiency. Since there is no teaching or suggestion by any of the cited references that proteins found in natural rubber reduce the efficiency of either grafting or epoxidizing natural rubber, then it logically follows that none of the cited references teach the unexpected advantages effected by deproteinizing the natural rubber prior to grafting or epoxidizing. A result not suggested by the prior art can impart patentability to a process whose manipulative steps are within the skill of the art. *In re Kaplan* (CCPA 1940) 45 USPQ 175.

Yasuyuki et al teach that the advantages of deproteinizing natural rubber include: i) elevating the green strength, ii) preventing allergic reactions, iii) lowers water absorptivity of the rubber, iv) improves electrical characteristics, v) improved mechanical properties, vi) improved crepe characteristics, vii) improved aging resistance, and viii) stabilizes the vulcanizing characteristics. There is no teaching or suggestion by Yasuki et al that proteins found in natural rubber will adversely affect the grafting or epoxidation of the natural rubber.

At most, the secondary references of Kondo et al, Burlett et al and Hayashi et al teach either the epoxidation or graft copolymerization of natural (nonmodified) rubber. These secondary references, when taken singularly or in

combination, neither teach nor suggest that the efficiency of the epoxidation or graft copolymerization of natural (nonmodified) rubber can be improved by removing the naturally occurring proteins prior to the epoxidation or graft copolymerization step.

The Examiner's attention is directed to Tables 1-3 on pages 20, 22 and 25 of the specification, respectively. The advantageous results effected by deproteinizing the natural rubber prior to grafting are clearly shown in Tables 1 and 3. The "N content" is the weight percentage of nitrogen, which is an indirect measure of the amount naturally occurring proteins in the natural rubber. It is clear that as the protein content decreases, the graft ratio increases, i.e., the percent of monomers which are grafted to the main chain backbone of the rubber polymer increases. Likewise, the epoxidation ratio increases as the protein content decreases as shown in Table 2.

Thus, if a prima facie case of obviousness existed, which it does not, Applicants submit that the advantages afforded by the present process are truly unexpected, and as such would have rebutted the prima facie case of obviousness. Applicants respectfully request the rejection be withdrawn.

Rejection Under 35 USC 112

Claims 1-3 and 7-10 stand rejected under 35 USC 112, first **and** second paragraphs. Applicants respectfully traverse the rejections.

The Examiner has objected to the phrase "epoxidation ratio per five hours".

In response, Applicants have amended the claim to particularly point out and distinctly claim the present invention. The above amendment reflects that the epoxidation reaction is defined by an epoxidation rate which is sufficient to produce a modified deproteinized natural rubber having an epoxidation ratio of 26.0% or more in 5 hours. Support for this amendment can be found in line 9 of page 21. Applicants respectfully submit that all of the claims fully comply with the provisions of 35 USC 112, first and second paragraphs. Withdrawal of the rejections is respectfully requested.

Conclusion

In view of the above amendments and comments, Applicants respectfully submit that the application is in condition for allowance. A notice to such effect is earnestly solicited.

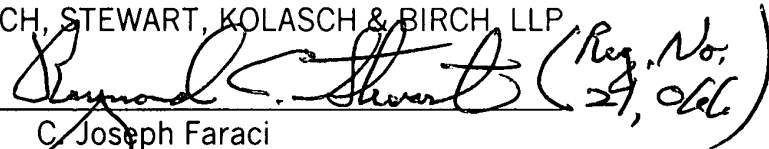
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Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Respectfully yours,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By


C. Joseph Faraci
Reg. No. 32,350

P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000

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CJF/GMD:cpw